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HEWLETT PACKARD

July 29, 1998

EX PARTE

Magalie R. Salas
Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554

Re: Ex Parte Report; PR Docket 92-235

Dear Ms. Salas:

The purpose of this letter is to report that the following employees of Hewlett-Packard Company: Michael Dempsey, Engineer-Scientist, Mark Kotfila, Project Manager, Robert Snyder, Development Engineer, Paul Tessier, R&D Section Manager, and Jonathan Weil, Senior Attorney, made an oral presentation to Kwok Chan, Office of Engineering and Technology, and Michael Wilhelm, Esq., Wireless Telecommunications Bureau.

The presentation consisted of a description of the specifications of and a demonstration of the operation of Hewlett-Packard medical telemetry transmitters and receivers. In addition, the Hewlett-Packard employees described experimental set-ups that may be appropriate for testing the susceptibility of medical telemetry receivers to interfering signals.

A copy of materials distributed and discussed during the presentation are attached to this letter.

Respectfully submitted,

HEWLETT-PACKARD COMPANY
By:

Jonathan L. Weil
Senior Attorney

JLW:vrt
Enclosure

cc: Michael J. Wilhelm, Esq.
Kwok Chan

What is Medical Telemetry?

The basic components of a medical telemetry system include a transmitter, receiver, antenna system and a Central Station.

- Patient worn transmitter powered with a 9 V battery.
- Secondary users in 460-470 MHz PLMR band.
- Only used in clinical environments; mostly indoors.
- GMSK digital modulation on 25 kHz channel spacings.
- Distributed active antenna system with antennas approximately every 40 feet.
- One receiver for every transmitter (FDMA).
- *Continuous* transmission of ECG and SpO2 data.
- *All* data is processed, monitored and recorded, so bad data is obvious.

What is Medical Telemetry? (cont.)

To assure high quality operation and acceptable up-time, the installation of the medical telemetry system is critical.

- All antenna systems are custom designed for each site. The design is based on standard rules and components.
- Typically a site will have 12 to 14 antennas and 8 channels.
- The largest sites have approximately 300 antennas (covering multiple buildings) and over 300 channels in constant operation.
- All antenna systems are designed to have a nominal gain of 0 dB.
- The system is designed to ensure a minimum mean received signal strength at the antenna of -65 dBm.
- The system is designed to tolerate a 30 dB Rayleigh fade (which occurs frequently).
- A typical system has a BER of 10e-5.

What is Medical Telemetry? (cont.)

Here are some of the specifications we expect for a typical system.

• System Noise Floor (10 kHz bw):	-119 to -110 dBm
• System Sensitivity:	-103 to -94 dBm
• Maximum Fade Depth:	30 dB
• Minimum Mean Signal Strength:	-65 dBm
• Transmitter Output Power:	+6 dBm
• System Dynamic Range (SFDR):	85 dB typical
• System Compression Point:	+5 dBm (at the antenna)

- Although the fading statistics are Rayleigh, since the doppler frequency is quite low (due to the patients walking at about 1 ft/sec) with a 30 dB fade margin we expect to see one 30 mS fade about every 30 seconds.

What is the Medical Telemetry Environment?

We operate in a hostile RF environment. We must have a very sensitive system while tolerating strong in-band interferers.

- The accompanying plots show our emitted spectrum and how it fits into the various Part 90 masks.
- There are currently too few interference free channels for the medical community to use.
- The Part 90 masks are specified as dB relative to the carrier, or dBc. This means that in many cases the noise floor specified by the mask is above our typical RSS. For example:

"D" Mask:	+37 dBm	(5W radio output)
	-70 dB	(noise floor)
=	-33 dBm	(vs our typical RSS of -65 dBm)

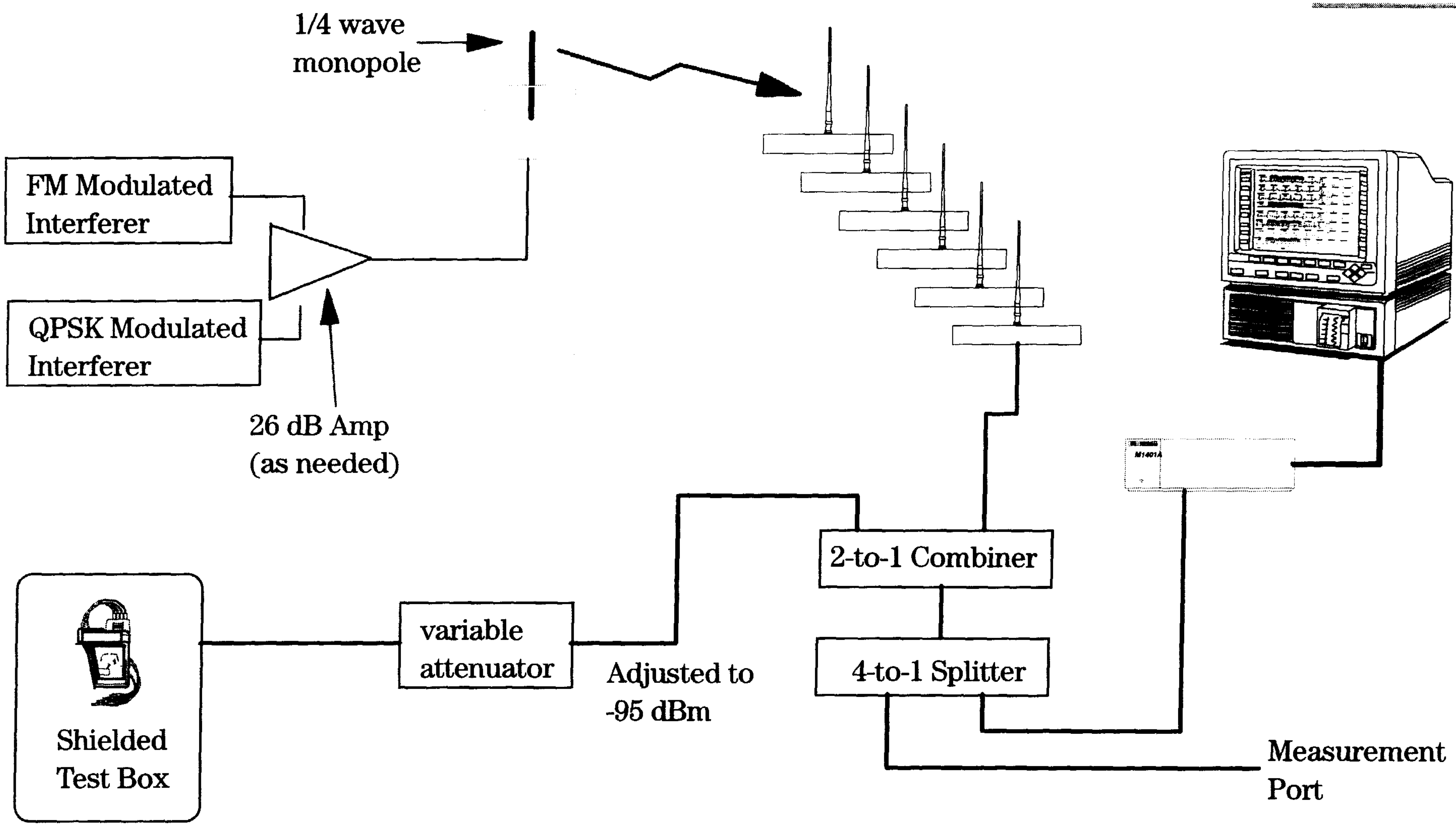
- The bottom line is this: medical telemetry requires a sensitive receiver, a low power real-time transmitter and large coverage areas. It's current use is limited by the number of interference free channels that are available. Refarming (as we understand it) will make this problem worse.

How Do We Duplicate the Real-World?

We are constantly faced with the problem of duplicating a real-hospital RF environment for experimentation and reproducing customer problems. We believe our system effectively does this.

- We have a standard antenna system with standard spacing.
- The specifications or our installation matches those we require for a hospital.
- We can create fading a number of ways, but the easiest is to simply create a permanent fade with an RF test box and a variable attenuator.
- We have shown that a transmitter worn by a person in our lab gives similar results to those we see in the field.
- We use all released products for these experiments, no engineering prototypes.

Medical Telemetry Interference Experimental Setup



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